EMS CATALOG NO: 15320
EMS PRODUCT: Eukitt Mounting Medium
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MATERIAL SAFETY DATA SHEET

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PRODUCT IDENTIFICATION

PRODUCT NAME: EUKITT (R) Mounting Medium

CAS NUMBER: 1330-20-7

CHEMICAL NAME: Xylene (commercial grade mixed isomers)

PERCENT BY VOLUME: 55%
DESCRIPTION(Uses): Mounting medium used in microscopy; adhesive and specimen preservative used in manual and automated coverslipping microscopic techniques. Adhesive for hermetically sealing non-plastic containers and container tops. Special purpose adhesive and sealant for use with glass, non-plastic and other non-reactive materials.

CAUTIONS: Xylene component of Eukitt is an eye, skin and mucous membrane irritant and may be narcotic in high concentrations. It is a dangerous fire hazard.

INGREDIENTS & EXPOSURE LIMITS

ACRYLIC RESIN SOLUTION: 45% by volume. Manufacturer's proprietary formula

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XYLENE SOLVENT: 55% by volume. User should assume CAS # 1330-20-7 commercial grade Xylene

MIXED ISOMERS which generally contain Isomer mixture of:
(20%) o-xylene (ortho) (20% p-xylene (para)
(40%) m-xylene (meta) (20%) ethylbenzene & small quantities of toluene

1991 OSHA PELs 1992-93 ACGIH TLVs
8-hr TWA:100ppm(435 mg/m3) TWA:100ppm(434 mg/m3)
15-min STEL:150ppm(655mg/m3) STEL150ppm(651 mg/m3)

1985-86 Toxicity Data**
Human, inhalation, TCLo:200ppm produced olfactory respiratory effects
Man, inhalation LCLoL1000ppm/6hr;effects not reviewed
Human, oral,LDLo50mg/kg:No toxic effect noted

1990 IDLH Level * 1990 NIOSH RELs
1000ppm TWA:100ppm(435 mg/m3)
STEL:150ppm(655 mg/m3)
***Immediate dangerous to life and health**

**See Niosh, TRECS(XE2100000), for additional toxicity data

PHYSICAL DATA

BOILING POINT: 279oF to 284oF (137oC to 143oC
MELTING POINT: -13oF (-25oC)
EVAPORATION RATE: N/A
SPECIFIC GRAVITY(H20=1): N/A
APPEARANCE/ODOR: A clear liquid; aromatic hydrocarbon odor.
WATER SOLUBILITY (%): Insoluble
% VOLATILE BY VOLUME: 55%
VAPOR PRESSURE: (8mbar) at 68oF(20oC)
VAPOR DENSITY: (0.95 g/cm3 out 20oC)
ODOR THRESHOLD: 1ppm

FIRE AND EXPLOSION DATA

Lower Upper

FLASH POINT and Method (Eukitt): 25oC/DIN51794 1% 7%

FLAMMABILITY LIMITS IN AIR: 1.2-7.0% by Volume

EXTINGUISHING MEDIA:

Use foam, dry chemical or carbon dioxide. Use water spray to reduce rate of burning and to cool containers if large quantities of Eukitt are involved in fire conditions.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Xylene vapor is heavier than air and may travel a considerable

distance to a low-lying source of ignition and flashback. Keep away from open flame.

FIRE FIGHTING PROCEDURES/SPECIAL:

Wear self-container breathing apparatus (SCBA) with full Face-piece operated in the pressure demand or positive- pressure mode.

REACTIVITY DATA

STABILITY: Stable in closed containers during normal storage and handling operations. Eukitt does not undergo hazardous polymerization.

CHEMICAL INCOMPATIBILITY:

Xylene component may react dangerously with strong oxidizers. Avoid contact with plastic materials or compounds; some rubbers and coated materials.

CONDITIONS TO AVOID: Avoid open flame, any exposure to sources of ignition and to strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS:

Carbon Monoxide (CO2) and other hydrocarbon by-products may evolve during fire.

HEALTH HAZARD INFORMATION

Eukitt and Xylene not listed as carcinogens by the IARC, NTP or OSHA.

SUMMARY of RISKS:

Xylene and Eukitt may act as a skin irritant. Excessive, direct prolonged contact should be avoided. Inhaling can depress central nervous system(CNS). Ingesting can result in gastro-intestinal disturbance and possibly vomiting. Extreme, prolonged inhalation could result in other adverse health effects. Existing medical conditions or problems with eyes, skin, central nervous system, kidneys and liver may be worsened by exposure to Xylene component.

PRIMARY ENTRY: Inhalation, excessive skin contact/absorption.

ACUTE EFFECTS: Dizziness; drowsiness; incoordination; irritation of eyes, nose and throat; nausea; vomiting; abdominal pain; and dermatitis.

CHRONIC EFFECTS: Visual dysfunction or injury; headache, loss of

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appetite, nervousness, pale skin and skin rash.

PRECAUTIONS: Use in well-ventilated area or under fume hood.

FIRST AID:

EYES: Immediately flush eyes (including under eyelids) gently but thoroughly with running water for at least 15 minutes.

SKIN: Immediately wash affected area with soap and water.

INHALATION: Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have trained People administer oxygen.
INGESTION:

Never give anything by mouth to someone who is unconscious or convulsing. Vomiting may occur spontaneously, but do not induce it. If vomiting should occur, keep exposed person's head below his or her hips to prevent aspiration (breathing the liquid Xylene into the lungs). Severe hemorrhagic pneumonitis with grave, possible fatal, pulmonary injury can occur from aspiring very small quantities of Xylene component. Get medical help (in plant paramedics, community) for all exposures. Seek prompt medical assistance for further treatment, observation and support after first aid.

SPILL, LEAK AND DISPOSAL PROCEDURES

SPILL/LEAK:

Notify safety personnel. Provide ventilation. Eliminate all sources of ignition immediately. Protect against contact with and inhalation of Xylene vapor. Contain spills. Collect waste or absorb it with an inert material such as sand, earth, vermiculite or other solvent absorbent material. Use tools or place waste liquid or absorbent into closable containers for disposal. Keep Eukitt and Xylene out of sewers, watersheds and

waterways.

WASTE DISPOSAL:

Legal incineration. Dispose of waste amounts of Eukitt by following Federal, State or Local regulations pertaining to proper disposal of commercial grade Xylene (CAS NO. 1330-20-7). SEE FOLLOWING REGULATIONS:

EPA Designations: (40 CFR 302.4)
OSHA Designations: Air Contaminant (26 CFR 1910 100 Subpart Z)
RCRA Hazardous Waste: No. U239
CERCLA Hazardous Substance; reportable quantity; 1000 lbs (454 kg)
Clean Water Act (CWA):Section 311 (b) (9).

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SPECIAL PROTECTION INFORMATION

PROTECTIVE EYEGLASSES may be worn. If splashing is possible when pouring Eukitt or Xylene from container, wear a full face shield as a supplementary protective measure. Follow OSHA eye and face protection regulations (29 CFR 1910.133). Wear IMPERVIOUS GLOVES. Use in well-ventilated area or under fume hood. Make EYEWASH STATIONS AND SAFETY WASHING FACILITIES available in areas of use and handling. CONTACT LENSES pose a special hazard; soft lenses may absorb irritants. All lenses concentrate vapors. DO NOT WEAR lenses in work area. Remove contaminated clothing and launder before wearing again. Clean from shoes and equipment.

COMMENT:

Practice good personal hygiene. Always wash hands thoroughly after using Eukitt. Keep Eukitt and Xylene off of clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking or smoking. Do not eat, drink or smoke in your work area. Do not inhale Xylene vapor contained in Eukitt mounting medium.

SPECIAL PRECAUTIONS AND COMMENTS

STORAGE:

Store Eukitt in a cool, dry and well-ventilated area away from possible sources of ignition. Protect containers from physical damage while storing or handling. Store as close to 20oC as possible.

TRANSPORTATION DATA: See 49 CFR 172.101-2

DOT ID: No. UN 1866

DOT SHIPPING NAME: Resin Solution

DOT HAZARD CLASS: Flammable liquid

DOT LABEL: Flammable Liquid

IMO LABEL: Flammable Liquid

IMO CLASS: 3.2 or 3.3

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hot-melt adhesive

A resinous adhesive which achieves a solid state and resultant strength by cooling, as contrasted with other adhesives which achieve the same results through evaporation or removal of the solvents. Before heating, a hot-melt adhesive is a thermoplastic, 100% solid material, and is all adhesive. Upon the application of heat, the usual operating temperature being in the range of 175 to 205 deg. C. (350 to 400 deg. F.), the material changes to a fluid state. Subsequent to the removal of heat, it sets by simple cooling.

When a hot-melt adhesive comes into close contact with the surface to be bonded, a molecular layer of film at the surface of this substrate immediately attains a temperature approaching that of the hot melt. In addition a high degree of wetting, almost coalescence. of the hot melt and the material occurs. Immediately thereafter, the adhesive loses heat to the film over the entire area and temperature equilibrium is attained. Since the adhesive is in contact with a mass much larger than itself, the temperature of the entire system drops to the point at which the hot melt sets to a solid state with sufficient cohesive strength to bond the films together. Thus the uniqueness of hot-melt adhesives stems from the speed with which they produce a bond, which is almost instantaneously.

Although the use of hot-melt adhesives eliminates the cost of solvents required by some other adhesives, the principal cost reduction results from the time saved in their application. In addition, a lesser quantity of the hot melt can usually be utilized to produce an equivalent bond.

Hot-melt adhesives are used extensively in binding books made of loose sheets, especially those that are not rounded and backed, e.g., paperback books, telephone and other directories, etc. For books that are to be rounded and backed, however, the so-called DRYING MEMORY of the hot-melt adhesives causes problems. In addition, hot-melt adhesives alone do not lend themselves well to the binding of heavily loaded or coated paper, from which all particulate matter must be removed before application of the adhesive. See also: ADHESIVE BINDING ;ONE-SHOT METHOD (1) ;TWO-SHOT METHOD .

(81 , 89 , 179 , 219 , 309)

Thermoplastic vs. Thermoset

Thermoset

- Permanently Rigid After Heating and Cooling
- Non-reversible Process. Material cannot be recycled.

Chemical Changes

- Lower Initial Material Cost
- High Heat/Creep Resistance
- Lower CTE
- Higher Arc Resistance

Thermoplastic

- Soften When Heated, Harden When Cooled, Soften When Reheated
- Reversible Process. Material can be recycled.

Physical Changes

- Lower Total Part Cost
- Higher Impact Strength
- Higher Flexural Strength
- Higher Tensile Strength
- Reduced Scrap

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The Applied Science of Weather Sealing

The most difficult problem in designing windows and doors is to create systems for maximum long-term performance in real-world environments.

Ironically, the most important component is the least expensive–weather seals.

Torture factors

Weather-stripping should perform through the service life of the window or door, sealing out air, water, dust and, noise–in spite of rain, snow, wind, sunlight, daily use and temperature changes. One of the greatest dangers is permanent compression set caused by thermal expansion and contraction of window and door construction materials.

Heat expands these materials, which compresses seals. Cooling contracts the materials and releases pressure on the seals, which must spring back into positive contact or lose their effectiveness. The loss of functional height is quick and permanent.

Material difference

Resistance to compression set is a function of weather-stripping material. These include PVC, polypropylene, TPE and urethane foam. While they are all plastics, designers should be aware of the significant differences between the two main classes: thermoplastic and thermoset.

Thermoplastic vs. Thermoset

Thermoset products resist compression set better than thermoplastics because of the way each is made. Heat and pressure fuse thermoplastic resins into a shape that is solidified by cooling. But reapplying enough heat and pressure–which occur in real world conditions–softens and deforms them. This is not the case with thermoset products, which harden by cross linking, forming a permanent three dimensional molecular structure. Subsequent heat and pressure cannot soften and deform them. Of course other factors, often determined by window and door design, contribute to sealing performance.Schlegel can offer good guidelines, since we make all types of seals and test hundreds of window and door systems in our fenestration test lab.

Is there a cure-all for compression set?

No. But one comes close. Schlegel's Q-LON™ weather seals have proven to be dramatically effective in more and more window and door systems. These multi-component seals are composed of a thermoset material core within a tough outer skin. Certified testing and widespread use show them to be superior in virtually every aspect of long-term efficiency.

Most important–to everyone from designers to end users–Q-LON seals demonstrate that the lowest cost component of a window or door system can add the most significant value.

For specification assistance, test data and information on any type of window or door seal, contact the world's leading source:

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Henlow Camp
Bedfordshire
United Kingdom
SG16 6DS

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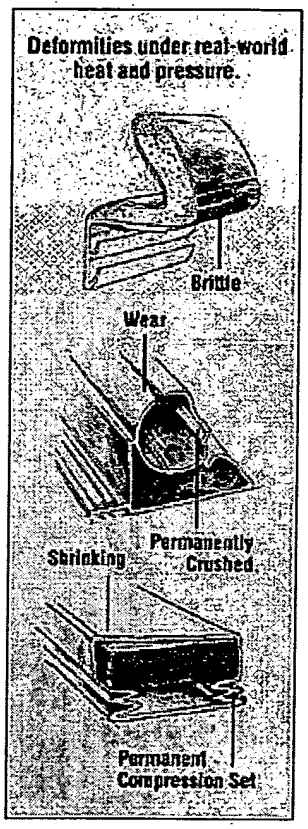

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Hot Melt Adhesives Technology Review

Released September 1998

View a summary of the hot melt adhesive technology review findings.

INTRODUCTION

As part of an overall project to provide industry representatives, researchers, technical assistance providers, research funders, and others with better access to information on pollution prevention research, the Pacific Northwest Pollution Prevention Resource Center (PPRC) undertook literature reviews on alternative solvent-free adhesive technologies that have the potential to replace conventional ozone-depleting and solvent-based adhesive systems. A set of three technology reviews covering hot melt adhesives, radiant-cure adhesives, and waterborne adhesives was prepared from the literature research.

This set is the first in a series of technology reviews being undertaken as an element of the Northwest Pollution Prevention Network that PPRC is coordinating. Technology reviews synthesize current research on P2 technologies, explore cost and technical issues, identify areas where further research is needed, and provide extensive bibliographies and glossaries. Each of the technology reviews will be available on PPRC's web site at http://www.pprc.org, where there will also be links to relevant projects in PPRC's research projects database, and links to relevant web sites.

Two segments of the adhesives industry are relevant to pollution prevention: adhesive formulation and adhesive application. This technology review focuses primarily on the application of hot melt adhesives as an alternative to conventional solvent-based adhesives.

More background information on adhesives can be found in a number of sources. Adhesives Bibliography

Industry background
A summary of the adhesives industry, including definition, applications, market trends, environmental/safety issues, drying and curing and alternatives.

Hot Melt Adhesives Defined
A description of hot melt adhesives, including uses and properties.

Technical Issues and Hot Melt Adhesives
A comparison of the performance of hot melt adhesives and solvent-based adhesives, key factors in successful application of hot melt adhesives, and advantages and limitations of hot melt adhesives as compared against solvent-based adhesives..

Adhesives Economics
A summary of research that evaluates the costs associated with a conversion to a solvent-free adhesive.

- **Gaps in Hot Melt Adhesives Research**
  An analysis of areas that merit further study.
- **Summary of Hot Melt Adhesives Technology Review**
- **Key Factors in Successful Application of Solvent-Free Technology**
- **Advantages and Barriers for Solvent-free Adhesives**
- **Adhesives-related Projects in the Pollution Prevention Research Projects Database**
- **Other Adhesives-related Internet Sites**
- **Adhesives Bibliography**
- **Glossary of Terms**

If you have topical suggestions for future P2 Technology Reviews, please send an e-mail message to Chris Wiley at cwiley@pprc.org. We also invite your general comments and feedback on the P2 Technology Reviews.

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Hot Melt Adhesives Defined

Defined

Hot melt adhesives are solvent-free adhesives, that are characteristically solid at temperatures below 180 degrees F (°F), are low viscosity fluids above 180°F, and rapidly set upon cooling. The development of hot melt adhesive technology stemmed from the previous use of molten wax for bonding. When this method no longer satisfied performance needs, 100 percent thermoplastic systems were introduced. Today, hot melt adhesives are used in a variety of manufacturing processes, including bookbinding, product assembly, and box and carton heat sealing.

There are a number of hot melt adhesives in use, with the most common being those used for hot melt pressure sensitive adhesive applications:

- ethylene vinyl acetate (EVA) copolymers, compatible with paraffin, the original hot melt;
- styrene-isoprene-styrene (SIS) copolymers;
- styrene-butadiene-styrene (SBS) copolymers;
- ethylene ethyl acrylate copolymers (EEA); and
- polyurethane reactive (PUR). (Refs. 6, 11).

Generally, these polymers do not exhibit the full range of performance characteristics required for an end product by themselves. Thus, "a variety of tackifying resins, waxes, antioxidants, plasticizers, and other materials are added to the adhesive formulation to enhance the polymer performance." (Ref. 6)

The latest hot melt adhesive advance is the PUR adhesive, which is a 100 percent solid, one-component urethane prepolymer that "behaves like a standard hot melt until it reacts with moisture to crosslink or chain extend, forming a new polyurethane polymer." (Ref. 12) By curing the polymer in this way, PURs have performance characteristics that are more enhanced than those of standard hot melts. (Ref. 12) Unlike many of the other hot melts, which require a slot die or roll coater (Ref. 6), PURs are applied to a substrate as a dot or a thin glue line, set in seconds, and are structurally rigid in minutes, following a final set. These adhesives have been accepted in many manufacturing industries, where they can be applied in small bond points to eliminate use of mechanical fasteners, such as staples, screws, rivets, clips, snaps, nails or stitching. (Ref. 13)

Uses and Properties

Hot melt adhesives are used "primarily for packaging, textiles, labels, and other pressure sensitive applications, disposable products, stamps and envelopes, and product assembly processes." (Refs. 2, 3) Table 2 describes several industrial sectors and applications in which hot melt adhesives are commonly used.

Table 2
Common Uses of Hot Melt Adhesives

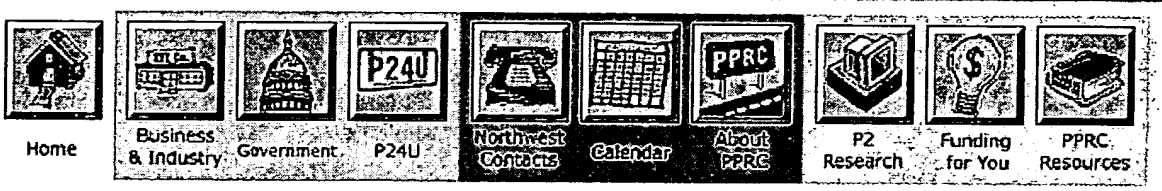
Industry	Application
Construction	Manufacture of laminated wood panels; kitchen countertops.
Non-rigid Bonding	Bonding of woven and non-woven fabrics; manufacture of athletic shoes, books, and sporting goods.
Packaging	Manufacture of cartons, boxes and corrugated boards; bags, envelopes, disposable products (diapers, paper products); cigarettes; and labels, stamps.
Vehicles	Aircraft and aerospace structural assemblies; automotive, truck, boat, and bus assembly; mobile home manufacturing.

Hot melt adhesives form a strong bond quickly simply by cooling (Refs. 2, 3), are compatible with most materials, and are clean and easy to handle. (Ref. 3) In general, hot melt adhesives are less water sensitive than other thermoplastic polymers, and are unaffected by water, moisture, or humidity, although if applied to a damp or wet surface the bonding may be poor. Hot melts can be formulated to increase their water sensitivity, as when used for stamps, envelopes and paper products that are to be recycled. (Refs. 2, 3)

Hot melt adhesives have some limitations that must be recognized. Hot melts cannot be used with heat sensitive substrates; the adhesive bonds lose strength at high temperatures; chemical resistance may be lacking with some types of hot melts; and exposure to high temperature environments can cause the adhesive to melt. Consequently, hot melt adhesives are inappropriate in situations where these limitations cannot be avoided. For example, hot melts should not be used on a substrate that would be near a heat source, such as a kitchen cabinet that would be placed near an oven. (Ref. 3) However, innovations in hot melts are removing some of these limitations: PURs are resistant to heat once they are cured, and could be used on substrates subsequently exposed to heat. (Refs. 2, 3)

Continue on to the technical issues page of the Hot Melt Adhesives Technology Review.

Return to the introduction of the Hot Melt Adhesives Technology Review.



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